

## **EPA NEW ENGLAND'S APPROVAL DOCUMENTATION FOR CT DEP'S LIMEKILN BROOK TMDL ANALYSIS**

**Effective Date: August 12, 2002**

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. §130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

*EPA New England received a **Total Maximum Daily Load Analysis for Limekiln Brook, Danbury, Connecticut** from Connecticut Department of Environmental Protection (CT DEP) on June 12, 2002, with a request to review and approve TMDLs for copper, zinc, chlorine and ammonia. The TMDL submission and our approval documentation includes the following:*

*Submittal letter dated June 6, 2002, and received by EPA New England June 12, 2002,  
Total Maximum Daily Load Analysis for Limekiln Brook, Danbury, Connecticut  
Response to Comments Received  
TMDL Support Document; Determination of Applicable Ammonia Criteria for the Limekiln  
Brook TMDL  
TMDL Support Document; Estimating Load Allocation for the Limekiln Brook TMDL  
Copy of Publication of Public Notice of TMDL in the News-Times, January 25, 2002*

- **Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking**

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll a and phosphorus loadings for excess algae.

***a. Description of surface water pollutant of concern and priority ranking as appears on 303(d) list:***

*The TMDL analytical document identifies Limekiln Brook as it appears in Connecticut's **1998 List of Waterbodies Not Meeting Water Quality Standards**, including its status as having a high probability of exceeding Connecticut Water Quality Criteria for copper and zinc. TMDLs are also developed for ammonia and chlorine to develop water quality based permit limits for these parameters. It is ranked as a top priority and targeted for development of TMDLs within two years.*

*An adequate description of Limekiln Brook's physical and biological characteristics, and watershed and land uses is presented in the final TMDL document (pages 2-7). Also, three figures are provided which locate the Brook and the watershed's lone point source, and show the land uses and surficial geology of the watershed. The TMDL section is the last one-mile section between the outlet of East Swamp Brook and Limekiln Brook's confluence with the Still River, of which it is a tributary.*

*Cooper, zinc, chlorine and ammonia are identified in the final TMDL document as the pollutants of concern. The final TMDL submission provides an adequate description of the sources of these pollutants: the City of Danbury Publicly Owned Treatment Works (POTW) and the site of the former Danbury landfill.*

*EPA New England concludes that the final TMDL document adequately identifies and describes the surface water, pollutants of concern, and the ranking of Limekiln Brook as it appears on the 1998 303(d) list.*

***b. Point source(s): magnitude and location***

*The TMDL analytical document identifies the sole point source as the City of Danbury Publicly Owned Treatment Works (POTW), and adequately describes its magnitude and location. It discusses (page 2) the plant's history and improvements, and its current operations. The TMDLs will be implemented by reissuing the National Pollutant Discharge Elimination System (NPDES) permit to the Danbury POTW with limits for the four pollutants this analysis covers.*

*EPA New England has determined that the Limekiln Brook TMDL submission adequately identifies and describes the point sources of pollutants.*

***c. Nonpoint source(s): magnitude and location***

*Limekiln Brook is a system whose watershed is 21 % developed and 19% open space. Though 58% forested, most of the developed area is around the TMDL section of the brook near downtown Danbury. Consequently, the brook is subject to the types of nonpoint sources of pollution that would be expected in most developed areas. In addition, leachate from the former Danbury Landfill, now covered by an impermeable membrane, is identified as a source of nonpoint pollution in these TMDLs' Load Allocations. Background levels of the target pollutants from nonpoint sources were*

*assumed to be comparable to levels in the Mattabasset River, which drains a similarly developed watershed that has no point sources. Estimates of contributions from the Danbury Landfill site were added to those background numbers.*

*EPA New England concludes that the final TMDL submission adequately identifies and describes the nonpoint sources of pollutants that need to be accounted for in this document.*

## **2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target**

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

### ***a. Description of Applicable Water Quality Standards***

*The TMDL document (pages 7 and 8) adequately describes the applicable water quality standards, including the designated use, and the applicable numeric criteria for copper, zinc, summer and winter ammonia, and chlorine (Table 1). Limekiln Brook is classified C/B for the length of the TMDL section, from the Danbury POTW to its outlet into the Still River. The C/B surface water classification indicates that Limekiln Brook is not meeting the water quality criteria that were adopted for it, nor does it support one or more of its designated uses. The goal for Limekiln Brook is achievement of Class B; designated uses for Class B surface waters include fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation. These TMDLs are for the length of the TMDL section, defined above.*

### ***b. Applicable Numeric Targets***

*The applicable numeric water quality criteria for copper, zinc, ammonia and chlorine are identified in the final TMDL document (Table 1), including the acute and chronic levels. They are consistent with CT DEP's water quality standards (CT DEP 1997), and in the case of ammonia, with the State of Connecticut's newly adopted ammonia criteria, which are pending approval from EPA at the time of this writing.*

## **3. Loading Capacity - Linking Water Quality and Pollutant Sources**

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that

a water can receive without violating water quality standards (40 C.F.R. § 130.2(f) ).

The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i) ). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1) ). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

#### ***a. Loading Capacity***

*The TMDL document identifies the loading capacities in Table 3 (page 11), and provides a discussion of the critical conditions for Limekiln Brook. Critical conditions are defined as the "worst case" scenario of environmental conditions in the Brook in which the pollutant load capacity in a TMDL will not exceed the Water Quality Criteria adopted by the State of Connecticut. The critical conditions for the copper, zinc, and chlorine TMDLs were defined as low flow summer conditions, and were applied to all seasons. Data were not available to directly estimate critical low flow conditions, so the critical, 7Q10 streamflow was estimated using the Cervione Method with additions for flow from the Danbury POTW and for leachate flow from the former Danbury landfill. The flow from the Danbury POTW was estimated from discharge data reported to DEP. The flow rate from the landfill site was estimated by a commonly recognized flow rate for such facilities, multiplied by the area of the site. There are no water diversions registered with CT DEP that must be accounted for. For ammonia, whose water quality criteria vary seasonally, separate critical flows were estimated for summer and winter.*

*The loading capacities for copper, zinc, and chlorine were calculated by multiplying the adopted water quality criteria by the critical stream flow conditions. To estimate the loading capacity for ammonia, DEP used new EPA guidance on developing the water quality criteria for ammonia, which involved using biological and chemical stream data, along with water temperatures. DEP used a statistical method of estimating these parameters from data on other similar Connecticut streams as data from Limekiln Brook were not available on these parameters. Based on this approach, EPA New England considers the loading capacities sufficient to meet water quality standards.*

#### ***b. Strengths and Weaknesses***

*A strength of the analysis is the conservative approach of calculating the load capacities based on the worse case condition of low flow during the July to October period, which by its definition has a low probability of occurring. Any additional flow would provide dilution and/or buffer any additional input of pollutants from stormwater, and improve the conditions. An additional strength of the analysis is that the TMDLs for copper and zinc assume all the available heavy metals entering the stream will be in dissolved form. This is a conservative assumption as some of the total metal concentration will be adsorbed onto particles in the stream and will be unavailable biologically to cause toxicity in organisms.*

*One weakness in the analysis is the unavailability of site-specific data to establish the nonpoint source and background loadings of the pollutants. Considering that CT DEP relied upon measured concentrations in a similar watershed, nonpoint background source contributions could be either higher or lower than estimated for Limekiln Brook. However, CT DEP based their estimates of nonpoint background sources on reasonable, conservative assumptions (page 16). EPA New England believes these assumptions are reasonable because they represent a practical estimation of pollutant concentrations in a similar watershed for which concentrations have been measured.*

#### **4. Load Allocations (LAs)**

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

*The TMDL analysis identifies the load allocations (LAs) on pages 11-16. The LA for Limekiln Brook was separated into two components: natural background and existing/future nonpoint LAs. The natural background LA and existing/future nonpoint LA were summed to calculate the total LA.*

*The natural background and load allocations were calculated by multiplying the critical streamflow under low flow conditions by the estimated concentration of copper, zinc, and ammonia. Concentrations of these pollutants were estimated based on observed concentrations in the Matabassett River which drains a similarly developed watershed that does not have any point source discharges. The concentration of chlorine was set to zero as no natural sources of chlorine*

*are known to exist. EPA New England believes this approach is reasonable because it represents a practical estimation of pollutant concentrations in the absence of data for the stream itself.*

*Although EPA is concerned with the use of the term “natural background” in characterizing nonpoint source contributions from what is considered normal use of land, both developed and non-developed, EPA endorses the procedure used for estimating background pollutant levels. Such background sources ought not to be termed “natural” as they are affected by human activities, albeit normal uses which do not individually cause exceedances of water quality standards. Please note that this does not impact the final load allocations of these TMDLs.*

*Existing/future LA was allocated to the former Danbury Landfill site. The load allocations for copper, zinc, and ammonia were calculated by multiplying the estimated leachate flow rate for capped landfills in general by the measured pollutant concentrations from monitoring wells at the landfill site. The existing and future load allocation for chlorine was set to zero as no nonpoint source of chlorine is known to exist, including from the landfill site.*

## **5. Wasteload Allocations (WLAs)**

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h) ). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

*The Danbury POTW is the only point source in the TMDL segment of the stream, and 100 percent of the Waste Load Allocation was allocated to it. The Waste Load Allocations for copper, zinc, ammonia and chlorine were calculated as the difference between the TMDLs and the Load Allocations. These Waste Load Allocations will be implemented through the reissuance of the NPDES permit to the City of Danbury for the POTW with the limits developed in these TMDLs.*

## 6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1) ). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

*The TMDLs have an implicit margin of safety built in. As the critical conditions under which the TMDLs are developed are worst case conditions of the minimum flow the Brook could experience (7Q10 conditions, as defined by Connecticut's Water Quality Standards), by definition they have a low chance of occurring. This represents a conservative approach to protecting aquatic life, as any condition better than critical low flow conditions would feature additional flow to dilute and/or buffer the presence of pollutants. Since the Brook's water quality is protected under critical low flow conditions, it will be protected under higher flows, and the result will be receiving water quality that is capable of attaining and maintaining water quality standards.*

*In its response to comments, the DEP states that the implicit margin of safety is sufficiently large to accommodate any small incremental increase in loads due to future growth. This is not the purpose of a margin of safety, which is designed as a buffer to account for uncertainties in the relationship between the allocations and water quality. If growth is a concern, the TMDLs should include an allocation for future growth. EPA believes in these TMDLs, however, that DEP's decision not to allocate specific loads to future growth is reasonable since such growth is not likely to be a problem in Limekiln Brook. As an "Urbanized Area" in the 2000 Census, Danbury will be included in the upcoming storm water Phase 2 regulations, which will necessitate the municipality taking active steps to curtail storm water nonpoint source contributions to Limekiln Brook and other water bodies under its jurisdiction. Such actions will likely abate most contributions of pollutants from nonpoint sources arising from future development and growth that would otherwise degrade Danbury's water bodies. If Phase 2 storm water regulations prove to be insufficient to control loads from future sources such that water quality standards are not attained or maintained, the TMDLs will need to be revised to better account for such sources.*

*An additional component of the margin of safety is that the TMDLs for copper and zinc assume all the available heavy metals entering the stream will be in dissolved form. This is a conservative assumption as some of the total metal concentration will be adsorbed onto particles in the stream and will be unavailable biologically to cause toxicity in organisms*

## 7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal

variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

*Separate TMDLs for ammonia were developed for summer and winter to account for seasonal variations in the CT Water Quality Criteria for ammonia, driven primarily by seasonal differences in water temperature and pH in Limekiln Brook. The summer ammonia TMDL was calculated using critical summer flows, while the winter ammonia TMDL was calculated using critical winter flows. No seasonal variation is included in the TMDLs for copper, zinc, and chlorine as the Water Quality Criteria for these pollutants do not vary seasonally, but remain in effect all year long. As the TMDLs for these pollutants were developed under critical low summer flows (which are the lowest for the whole year), they will be protective in all seasons.*

## **8. Monitoring Plan for TMDLs Developed Under the Phased Approach**

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

*Although monitoring implementation plans are not a required element for the development of a TMDL and its final approval, CTDEP included implementation in its TMDL development (page 18). The TMDL submission states that the City of Danbury will do water quality monitoring and assessment for copper, zinc, ammonia, and chlorine as part of the terms of the reissued NPDES permit for the Danbury POTW. DEP's Bureau of Water Management will continue to collect data on surface water chemistry in Limekiln Brook. In addition, the DEP will conduct water quality monitoring as described in the CT DEP Rotating Basin Ambient Monitoring Strategy. DEP will monitor the fish population in Limekiln Brook.*

## **9. Implementation Plans**

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be



achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

*Although implementation plans are not a required element of the development of TMDLs and their final approval, CT DEP included implementation in its TMDL development (page 18). The TMDLs will be implemented by incorporating the Waste Load Allocations specified in these TMDLs into the reissued NPDES permit (# CT 0100145) to the City of Danbury for the Danbury POTW.*

## **10. Reasonable Assurances**

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

*The TMDL submission states that the NPDES permit issued to the City of Danbury POTW provides a legally enforceable control document and offers reasonable assurance that Water Quality Standards will be met in the TMDL segment of Limekiln Brook.*

## **11. Public Participation**

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

*Public participation for these TMDLs was achieved in accordance with CT DEP's statutes. Documentation of the public participation and DEP's response to comments were included in the TMDL submittal to EPA, in the form of copies of the public notice of and request for comments on the draft TMDLs in the Danbury News-Times newspaper, January 25, 2002, and the submitted document, "Response to Comments received for Proposed Total Maximum Daily Load Analysis for Limekiln Brook, Clinton, Connecticut." This TMDL analysis was modified from an earlier draft based on comments received from reviewers through the public participation process.*

*EPA New England concludes that CT DEP provided reasonable opportunity for public involvement and comment.*

## **12. Submittal Letter**

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

*The submittal letter (dated June 6, 2002, and received by EPA New England on June 12, 2002) adequately identified the TMDLs as a final document submitted under Section 303(d) of the Clean Water Act for EPA review and approval.*